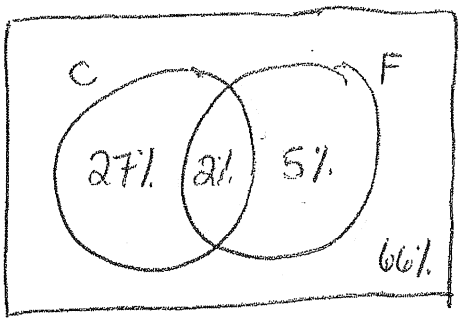
p. 405

① 

ⓐ $P(C \cup F) =$
$P(\text{defect}) = P(C) + P(F) - P(C \cap F)$
$= 0.34$

ⓑ $P(C \cap F^c) = 0.27$

ⓒ $P(F|C) = \frac{P(F \cap C)}{P(C)} = \frac{0.02}{0.29} = 0.069$

ⓓ No they are not disjoint b/c $P(F \cap C) \neq 0$.
$0.02 \neq 0$

ⓔ Yes they are independent b/c $P(F|C) \approx P(F)$.
$0.069 \approx 0.07$.

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② @ i) $P(P) = 90/150 = 0.60$

ii) $P(F \cup P) = \frac{45+72+12+6}{150} = 0.90$

iii) $P(F|\text{prod.}) = \frac{72}{117} = 0.615$

iv) $P(P|F) = \frac{72}{90} = 0.80$

ⓑ $P(F) = 90/150 = 0.60$

$P(F|P) = 0.615$ (from letter a)

$P(F|P) \neq P(F)$ therefore they are dependent

③ $\mu_C = 1000$ $\mu_F = 500$

$\sigma_C = 150$ $\sigma_F = 100$

ⓐ C = china, F = france total = C + C + C + F + F + F + F + F

ⓑ $\mu_{total} = 1000 + 1000 + 1000 + 500 + 500 + 500 + 500 + 500$

$= \$5500$

$\sigma_{total} = \sqrt{(150)^2 + (150)^2 + (150)^2 + (100)^2 + (100)^2 + (100)^2 + (100)^2 + (100)^2}$

$= \sqrt{(3 \cdot 150^2) + (5 \cdot 100^2)}$

$= \sqrt{67500 + 50000}$

$= \sqrt{117500}$

$= \$342.78$

ⓒ $\mu_{C-F} = 1000 - 500 = \$500$

$\sigma_{C-F} = \sqrt{150^2 + 100^2} = \$180.28$

ⓓ we must assume the prices are all independent

---

④ $p = 1/100$ $n = 10{,}000$ $B(10{,}000, 1/100)$

check

$(10000)(1/100) \neq 10$

$(10{,}000)(99/100) \checkmark$

$P(x > 200)$

= normalcdf(200, ∞, 99, 9.95) ($\mu = 100$, σ)

$= 4.667 \times 10^{-24}$

$\Rightarrow$ normal $N(100, 9.95)$

$\mu = np$

$\sigma = \sqrt{npq}$

(5)

x	\$0	\$2	-\$2
$P(x)$	0.10	0.40	0.50

(a) $\mu_x = -\$0.20$

$\sigma_x = \$1.89$

(b) $\mu_{x+x} = -\$0.40$

$\sigma_{x+x} = \sqrt{1.89^2 + 1.89^2} = \$2.67$

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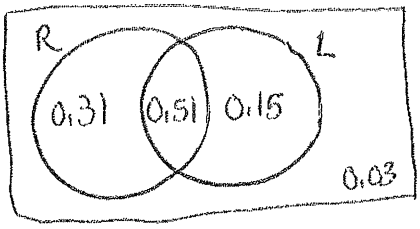
(6)



(a) $P(R^c \cap L^c) = 0.03$

(b) $P(R \cap L) = P(R) \cdot P(L)$

$0.51 = (0.66)(0.82)$

$0.51 \neq 0.5412$

They are not independent

(c) No. $P(R \cap L) \neq 0$

$0.51 \neq 0$

(12) (a)

X	5	10	20
P(X)	0.50	0.25	0.25

(b) $\mu_X = 10$

$\sigma_X = 6.123$

(c)

Y	0	1	2	3	4
P(Y)	1/3	1/6	1/6	1/6	1/6

(d) $\mu_Y = 1.667$

$\sigma_Y = 1.491$

(e) $\mu_{X+Y} = 10 + 1.667 = 11.667$

$\sigma_{X+Y} = \sqrt{6.123^2 + 1.491^2} = 6.302$

---

(13) $P(L) = 0.80$ $P(R) = 0.10$ $P(\text{two}) = 0.10$

(a) $n = 25$ $p = 0.80 = P(L)$ $B(25, 0.80)$

$P(X \le 15) = \text{binomcdf}(25, 0.80, 15) = 0.0173$

(b) $n = 5$ $p = 0.10 = P(2)$ $B(5, 0.10)$

$P(X = 0) = \text{binompdf}(5, 0.10, 0) = 0.59049$

(c) $n = 1200$

$\mu_L = 1200 \cdot 0.80 = 960$ people

$\mu_R = 1200 \cdot 0.10 = 120$ people

$\mu_2 = 1200 \cdot 0.10 = 120$ people

(d) $B(1200, 0.10)$

$\mu_R = 120$ people (work in letter c)

$\sigma_R = \sqrt{1200 \cdot 0.10 \cdot 0.90} = 10.392$ people

(e) don't do

(16) • $p = 0.73$ = rise = $P(R)$

(a) $P(R \cap R \cap R) =$ 0.389017

(b) $B(5, 0.73)$

$P(x = 3) = \text{binompdf}(5, 0.73, 3) =$ 0.2836

(c) $p = 0.27$ = fail

$B(5, 0.27)$

$P(X \geq 1) = 1 - P(x \leq 0) = 1 - \text{binomcdf}(5, 0.27, 0) =$ 0.793

(d)

$B(10, 0.73)$ 6 = majority

$P(X \geq 6) = 1 - P(x \leq 5) = 1 - \text{binomcdf}(10, 0.73, 5) =$ 0.8963

---

(17) $n = 50$ $p = 0.25$ $B(50, 0.25)$

(a) $P(x \geq 30) = 1 - P(X \leq 29) = 1 - \text{binomcdf}(50, 0.25, 29) =$ 1.64×10^{-7}

OR check:

$(50)(0.25)$
$(50)(0.75)$ $\checkmark \not\geq 10 \Rightarrow P(x \geq 30) = \text{normalcdf}(30, E99, \mu, \sigma)$

$= 5.48 \times 10^{-9}$

$\mu = np$
$\sigma = \sqrt{npq}$

(b) $B(50, 0.70)$

$P(X \geq 30) = 1 - P(x \leq 29) = 1 - \text{binomcdf}(50, 0.70, 30) =$ 0.9522

OR check

$(50)(0.30) \not\geq 10$
$(50)(0.70) \checkmark \Rightarrow P(x \geq 30) = \text{normalcdf}(30, E99, \mu, \sigma)$

$= 0.9386$

(c) P(WnWnR) = $(0.30)(0.30)(0.70) = 0.063$

wrong right

(19) Profit

X	−$9500	$500
P(X)	0.026	0.974

$\mu_X = \$240$

---

(20) $p = 0.30 = P(S)$

(a) $P(S^c \cap S^c \cap S^c \cap S^c) = (0.7)(0.7)(0.7)(0.7) = 0.2401$

(OR)

$B(4, 0.30)$ $P(X=0) = \text{binompdf}(4, 0.30, 0) = 0.2401$

(b) $P(S^c \cap S^c \cap S^c \cap S^c \cap S^c \cap S) = (0.7^5)(0.3) = 0.0504$

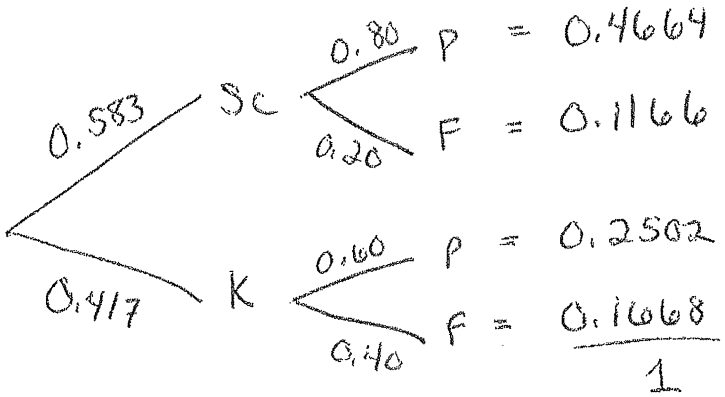
(c) $B(10, 0.3)$

$P(X \leq 2) = \text{binomcdf}(10, 0.3, 2) = 0.3828$

---

(21) $P(P \mid Sc) = 0.80$ $P(Sc) = 79/120 = 0.583$

$P(P \mid K) = 0.60$ $P(K) = 59/120 = 0.417$



1

(a) $P(P) = 0.4664 + 0.2502 = 0.7166$

(b) $P(K \mid F) = \dfrac{P(K \cap F)}{P(F)} = \dfrac{0.1668}{0.2834} = 0.5886$

$B(120, 0.30)$

(22) (a) $\mu_X = np = 120(0.30) = 36$ students

(b) $\sigma_X = \sqrt{npq} = \sqrt{120(0.3)(0.7)} = 5.02$ students

(c) the check passes:

$(120)(0.3)$
$(120)(0.7) \not\geq 10$

(23) (a) $\mu_{X+50} = 100$

$\sigma_{X+50} = 8$

(b) $\mu_{10Y} = 1000$

$\sigma_{10Y} = 60$

(c) $\mu_{X+0.5Y} = 50 + (0.5 \cdot 100) = 100$

$\sigma_{X+0.5Y} = \sqrt{\sigma_X^2 + \sigma_{0.5Y}^2} = \sqrt{(8)^2 + (0.56)^2} = 8.54$

(d) $\mu_{X-Y} = 50 - 100 = -50$

$\sigma_{X-Y} = \sqrt{\sigma_X^2 + \sigma_Y^2} = \sqrt{8^2 + 6^2} = 10$

(e) $\mu_{X+Y} = 100$

$\sigma_{X+X} = \sqrt{8^2 + 8^2} = 11.31$

(28) $\mu_A = 22$ $\mu_B = 18$ A = 1st store
$\sigma_A = 2.5$ $\sigma_B = 2$ B = 2nd store

(a) $\mu_{A-B} = 22 - 18 = 4$ lbs

(b) $\sigma_{A-B} = \sqrt{2.5^2 + 2^2} = 3.202$ lbs

(c) NORMAL
$P(A > B)$
$-B \quad -B$

$P(A-B>0) = \text{normalcdf}(0, E99, 4, 3.202) = 0.8942$

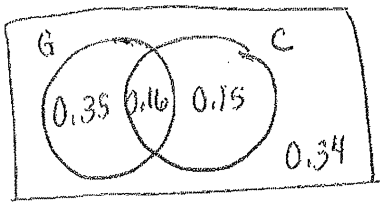
(31) $p = 0.26 = P(W)$

(a) $P(W \cap W \cap W) = (0.26)(0.26)(0.26) = 0.017576$

(b) $P(W^c \cap W^c \cap W^c \cap W^c) = (0.74)(0.74)(0.74)(0.74) = 0.2999$

(c) Independent events! $P = 0.26$ on each call

(35) $P(G) = 0.51$
$P(C) = 0.31$
$P(G \cap C) = 0.16$



(a) $P(G^c \cap C^c) = 0.34$

(b) $P(G \cap C^c) = 0.35$

(c) $P(C \mid G) = \frac{0.16}{0.51} = 0.314$

(d) $P(C|G) = P(C)$
$0.314 = 0.31$ ✓

Yes, they appear to be independent

(36)

X	1	2	3+	0
P(X)	0.18	0.04	0.01	0.77

* Visit 2 homes

(a) $P(X=0) = 0.77$ $\quad P(X=0 \cap X=0) = (0.77)(0.77) = 0.5929$

(b) [illegible] $\quad 1 - P(X=0^c \cap X=0^c) = 0.4071$ ← opposite

(c) $P(X \geq 1) = 0.23$ = some dogs

$P(X \geq 1 \cap X \geq 1) = (0.23)(0.23) = 0.0529$

(d) $P(X \geq 2) = 0.05$ = more than 1 dog

$P(X \geq 2 \cap X \geq 2) = (0.05)(0.05) = 0.0025$

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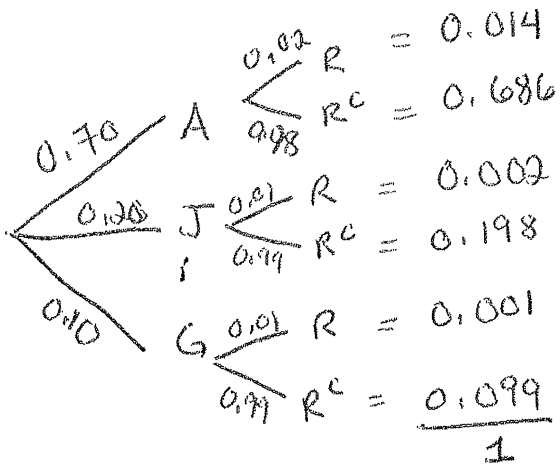
(40)



(a) $P(R) = 0.014 + 0.002 + 0.001 = 0.017$

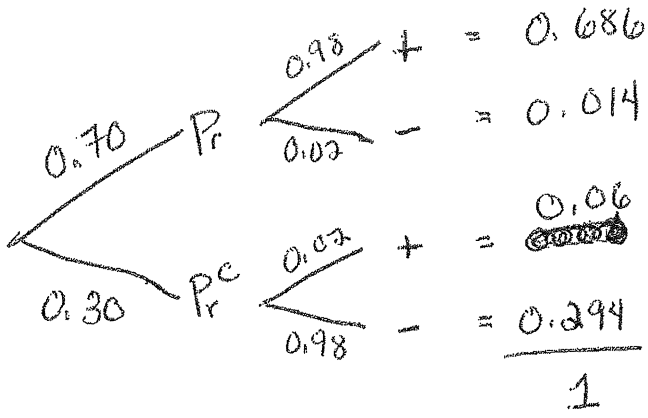
(b) $P(A|R) = \frac{0.014}{0.017} = 0.8235$

(41) $P(Pr) = 0.70$

$P(Pr^c) = 0.30$

$P(+|Pr) = 0.98$ } accurate

$P(-|Pr^c) = 0.98$



$P(+) = 0.686$
$+ 0.006$
$= 0.692$

$$P(Pr|+) = \frac{P(Pr \cap +)}{P(+)} = \frac{0.686}{0.692} = 0.9913$$